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NATURAL SCIENCE.

WILBUR S. JACKMAN.

DURING the autumn quarter, for first-year students, the work in nature study and geography will be combined. The subject-matter of the combined course in the early part of the quarter will be derived from field study covering various areas that lie within reach of the school. For detailed experimental work in nature study a vacant lot, embracing a city square has been selected for a special survey. Beginning the investigation at the close of the growing period, it will be the general purpose to determine what the work of the season has been, both in variety and in amount, and also to study carefully some of the conditions underlying what has been done.

The nature-study survey of the vacant lot will be conducted under the following heads:

1. *The plant life.*—This will include the collecting of examples of all the different kinds of plants found growing in the area. These will be arranged to illustrate various relationships to each other, to the soil, and to the season. An effort will be made, also, to determine the order in which the plants have invaded the lot, dating back to its marsh conditions.

Experiments will be performed to determine approximately how much mineral and organic matter has been built up by the plants into their own structures during the season. Special study will be made of all the devices by which the plants prepare for winter, such as the fall of the leaf, the distribution and planting of seeds, and the underground habits.

2. *The animal life.*—Similar collections will be made of all animal forms that may be found. The relationships of these to each other, to the soil, and to the season will be carefully worked out. How they secure their food, avoid or conquer their enemies, and how they prepare themselves for the winter, are the fundamental questions about which the study will center.

3. *The soil.*—An investigation of the soil and subsoil to a

depth of two or three feet. This will include an approximate determination of its constituents—mechanical, and some of the more easily found chemical elements. This study will include the determination of the amount of water the soil contains, the amount necessary for saturation, the rate of evaporation, and its capillarity.

4. *Sunshine.*—By means of the skiameter the varying intensity of the sunshine for the different months of the growing season will be determined. The condition of the plants and animals during the different periods will be noted; also, the variation of intensity during different hours of the same day.

5. *Rainfall.*—Taking the records of the weather bureau, calculations will be made of the amount of water received by the plants during the growing season. Comparisons will be made with the average for the past thirty-two years of the Chicago weather bureau's records. Using the new weather chart, the student will indicate in colors the distribution and amount of sunshine and cloudiness during the season.

6. *Temperature.*—This will be taken of both air and soil. The temperature of the latter will be taken at different depths down to about three feet. The results of these observations will be plotted on the weather chart mentioned in (5) above, so that the relations will be quite obvious. From the weather-bureau records the air temperature for the season will be similarly plotted.

In addition to this special study of the area selected, the students will be trained also in the use of the barometer, psychrometer, and the instrument used in giving the direction and in measuring the velocity of the wind. The results of these observations will be plotted on the chart mentioned in (5) and (6), which is so designed as to enable the students to represent them in graphic and compact form.

In addition to the foregoing, each student will paint in water colors a history of the landscape as the season advances. This will require, on an average, perhaps one painting a week. Number work and all the various modes of expression will be used when necessary. Students will be required, also, to prepare experimental work in physics and chemistry where it is needed to explain such natural phenomena as may occur in the course of their nature study survey.

Later in the quarter this work will be followed by lessons on the winter conditions found outdoors; upon clothing and animal coverings; upon heating, lighting, and ventilating of dwellings; and upon fuels and foods. Outlines of these topics will appear later.

The practice teaching in the elementary school will follow the main lines of study indicated for the pedagogic school. In their plans for teaching, students must show a grasp of subject-matter, and also give evidence of some skill in its adaptation to the particular grade in which the lessons are to be taught